Answers

Step 1: ultra-filtration

1. How did the water change in appearance after it was filtered?

   Depends on student's wastewater sample. Water should be less cloudy and large pieces of solids should be removed.

2. What did residue in the filter paper look like?

   Again depends on initial wastewater sample. Particles should have been caught in filter paper.

3. How did your process differ from that used by Water Corporation?

   Filter paper used in the student experiment had much larger pores in it than material used by the Water Corporation. This means the student's water sample will have more contaminants remaining in it.

Step 2: reverse osmosis

4. Has the appearance of your water changed after passing through the dialysis tubing? Explain why you would or wouldn't expect to see a difference.

   The outcome depends on student's wastewater sample. The sample may be less cloudy than before treatment or all visible particles may already have been removed by filter paper.

5. Why is this process so slow? Suggest how it could be made faster.

   Water needs to be forced through dialysis tubing. In this case only gravity is used to push some water through. The process would be faster if pressure was applied to the tubing. This could be done by twisting or squeezing tubing to force water out.

6. Treating water using reverse osmosis at the treatment plant is expensive. Why is this?

   The Water Corporation's process uses large amounts of energy to provide pressure to force water through membranes. The amount of electricity required makes this expensive.

Step 4: Testing the treatment process

7. How do your fully treated and no treatment agar plates compare in appearance?

   Answers will vary depending on experimental results. In theory a lot more bacteria grow on the agar plate with untreated water on it than on the one with UV treated water.

8. How do the results compare between untreated water and water that only underwent filtration and reverse osmosis? Explain why this is.

   Answers will vary depending on experimental results. In theory partially treated water will have almost as much bacteria as untreated water. This is because bacteria are so small they'll fit through pores in filter paper and dialysis tubing so will not be removed by either of these methods.

9. Was the UV treatment successful in killing bacteria? Explain how you can tell.

   Answers will vary depending on experimental results. The plate treated with UV light should grow the least bacteria because UV light mutates a bacteria's DNA making it unable to reproduce.

10. Was your treatment successful? Explain.

    Answers will vary depending on experimental results.

11. How could your treatment process have been improved?

    Answers will vary.

12. Why did the Water Corporation do a trial of the process before building the whole scheme?

    In all scientific experiments it is best practice to run a trial first to make sure that the process works. This is particularly the case here because it's expensive to build a full treatment plant.

13. Why does the Water Corporation use such a rigorous process to treat water?

    It's important water is cleaned properly before being returned to the water table because otherwise contaminants will spread and may make people sick.

Example results